Coastal Observation Technology System Project Summary – 2004

Project Name/Title: Center of Excellence for Coastal Ocean Observation and Analysis (COOA)

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Recipient Institution: University of New Hampshire (UNH)

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Brief Project Summary: The primary mission of COOA is to develop and implement new methodologies for monitoring coastal marine ecosystems. The goal is to develop the capability to detect, model, and ultimately forecast changes in the Western Gulf of Maine ecosystem. The information generated by COOA will help researchers gain a mechanistic understanding of the factors controlling the coastal ocean and estuarine ecosystem in the region, and thus will play an important role in decisions related to ecosystem-based management. The objective is to establish a complete end-to-end observing system for the region of interest in the Western Gulf of Maine, centered at the mouth of the Piscatagua River and extending north to Casco Bay and south to Stellwagen Bank.

Three main goals:

- To develop and implement new methodologies for monitoring coastal marine ecosystems
- To promote and demonstrate the dissemination and use of coastal ocean observing data and information by diverse users.
- To complement and enhance national and regional expertise in coastal ocean observing.

The system includes three subsystems:

- Data acquisition – A combined effort using remote sensing and in-situ monitoring with an emphasis on developing automated methods amenable to operational use.
- Data management and distribution – WebCOAST is the portal for all COOA data, as well as other data including historical archives and on-going regional monitoring programs.
- Modeling and analysis – A fine-mesh coupled physical–biological model for the region will benefit scientists, resource managers, and teachers and students.

Accomplishments to Date:

- Field sampling efforts have been integrated to collect a comprehensive suite of ecological and environmental data at 16 stations, including 2 GoMOOS buoys, monthly.
- The FleetLink sensor system has been installed on two coastal research vessels, the R/V *Gulf Challenger* and R/V *Tioga*, with fully georeferenced real-time data transmission.

- A time series beginning in 2000 of eight-day averaged sea-surface temperature and chlorophyll satellite observations for the Northeast are available on WebCOAST. The data are from the MODIS sensors.
- The time series of biogeochemical measurements at the Martha's Vineyard Coastal Observatory was augmented with a two-week spatial survey in June 2004 to characterize dynamics of coastal carbonate chemistry.
- A unique flow-through system acquired to measure carbonate chemistry, together with biological and physical properties, is being used to survey pCO_2 in estuarine plumes.
- WebCOAST data services have been augmented to provide seamless access to all COOA data regardless of where the data reside.
- COOA is partnering with others in the region to share data as members of the Gulf of Maine Ocean Data Partnership, which held its first meeting at Woods Hole in April 2004.
- An ecological community index has been created to characterize and monitor seasonal patterns in the plankton community and a paper has been accepted for publication based on this work.
- COOA is partnering with GoMOOS to develop educational materials and train teachers to use observing data. A workshop held at UNH in June was attended by 20 educators.

Current Year Objectives:

- Core variables (including nutrients, temperature, salinity, chlorophyll, zooplankton biomass) measured during the field sampling (cruises) will be served routinely on WebCOAST.
- Primary production estimates for the Gulf of Maine region will be produced and served in near-real time using algorithms developed and validated with field measurements.
- WebCOAST will partner with the Gulf of Maine Council to house and provide a searchable database of Gulf of Maine monitoring programs.
- A chapter for the *Earth Exploration Toolbook*, entitled "When Is Dinner Served? Predicting the Spring Phytoplankton Bloom in the Gulf of Maine," will be published in July.
- Two complete years of the ecological community index will be completed in September, and the data and results furnished to the Northeast Fisheries Science Center.
- A memorandum of understanding will be developed with GoMOOS detailing the respective roles and joint commitment to the establishment of a regional ocean observing system.
- A workshop at UMass-Boston on July 15 will bring together physicists and biologists to develop linkages for collaborative, multidisciplinary modeling efforts for the Gulf of Maine.

Partners: Gulf of Maine Ocean Observing System (GoMOOS), Northeast Fisheries Science Center, Martha's Vineyard Coastal Observatory, Northeast Center for Ocean Science Education Excellence (COSEE), Gulf of Maine Council, Massachusetts Coastal Zone Management, Regional Association for Research on the Gulf of Maine, and the Northeast Consortium.